excessive beam-trawling in the in-shore waters has formed the subject of several Parliamentary inquiries; but from want of trustworthy statistics or scientific evidence the conclusions arrived at have not always been in agreement. The result of the *Garland* experiments and the statistics collected shows that in those areas where trawling is prohibited, the fish, especially the flat-fish, have largely increased and the number of young fish is greater than formerly. The results of the *Garland's* investigations as to the distribution of edible fishes, their numerical variations at different seasons, and the proportional abundance of young and adults are also given, and the scientific statistics collected are discussed in detail. It is evident that by the systematic collection of scientific statistics regarding the productiveness of the fisheries and the relative influence of special modes of fishing, the migration, the spawning processes, and the general life-history of the fishes themselves, a great deal will be accomplished for the promotion of the fishery industries of Scotland. In this connection it will be seen that the investigations carried on by the *Garland* are calculated to have a high value, since the data thus collected are wide in their scope, systematic, and trustworthy. Without the use of a vessel specially adapted for the purpose such investigations would be impossible.

Section B contains the biological investigations. The paper on "The Scottish Lobster Fishery," by Prof. Ewart and T. Wemyss Fulton, M.B., discusses at due length the interesting question as to the best means of restoring this fishery to its old place in our seas and in our markets. Slowly but surely lobsters have been diminishing in size and number and rising in price; and our once famous home lobster market has to be supplemented by supplanting foreign supplies, simply because Scotch lobsters cannot be got in sufficient numbers of a marketable size. The older and most valuable lobsters have been cleared out, and the less mature forms are being drawn upon. Unfortunately also, the female lobster being much more valuable for cooking purposes, the "coral" is sometimes collected alone, and so, by the systematic destruction of its ova, the lobster is seriously handicapped in the struggle for existence. The use of "creels" or "pots," instead of the older-fashioned "rings," has been also an important factor in bringing about the "over-fishing." The legislation of lobster-fisheries is a very difficult matter, and in Canada, where the restrictions are very severe, they have failed in their aim. It is impossible to set one fixed close-time all over Scotland, as there is no general agreement among fishermen as to which time would be most serviceable. The institution of a minimum legal size is a regulation generally adopted, and it is proposed that the gauge of 8 inches should be raised to 9 inches. Further, that, as in Norway and the United States, artificial culture should be resorted to. By artificially hatching the eggs and rearing the young through the larval stages till they have reached a certain size, they are protected from their natural enemies, and if then transferred to the sea would be better able to take care of themselves. That the process is feasible has been shown both in Norway and the United States. A complete lobster-hatchery could be established for a comparatively small sum at some suitable point on the west coast. Unless some steps be taken, the lobster fishery of Scotland is likely to become the memory of a pleasant and profitable past. Mr. Thomas Scott gives in interesting detail, a "Revised List of the Crustacea of the Firth of Forth," which records 230 species, including 41 of Ostracoda, 42 of Copepoda, and 13 Schizopods. Of these species many are new to the district, and two Copepods—*Aztrotrogus papillatus* and *Cyclops ewarti*—new to science. This list is a valuable addition to our knowledge of the Crustacean fauna of this region, previously studied by Leslie, Herdman, Henderson, and others. Mr. Scott also supplies notes on the contents of the stomachs of herring and haddock, and on interesting fishes, &c., sent to the University of Edinburgh. The nature of "red cod," a fungoid condition sometimes met with in the preserved fish, is described by Prof. Ewart; Dr. Edington furnishing and figuring the results of a bacteriological investigation as to the nature of the organisms present, and the cause of the red coloration. Red cod was first noticed in America, but has since been observed in various places, including two as far apart as Algiers and the Hebrides. Used as food in this state, the results may be disagreeable or even dangerous. It was generally referred to the presence of a minute Fungus (*Clathrocytis roseo-persicina*), but Dr. Edington ascribes it to a special Bacillus (*Bacillus rubescens*), which also existed in the salt used for curing, and thus infected the fish. Mr. W. L. Hoyle reports on biological investigations in the sea to the west of Lewis during July and August 1887, and gives a list of the various forms obtained. Prof. McIntosh, F.R.S., gives Reports from the Marine Station at St. Andrews. These deal chiefly with the stages of development in several of the food-fishes, and with the Annelids and other forms used as bait. Mr. Calderwood furnishes notes on an intra-uterine specimen of the porbeagle (*Lamna cornubica*); and Mr. J. Murray on the fishing-grounds of the Stonehaven district, of which he is officer. A new and edifying feature of the Report is furnished by Dr. Wemyss Fulton's account of contemporary work relating to the scientific and economic aspects of the fisheries. The contemporary work carried on in England and Ireland, United States, Germany, Norway, Denmark, Holland, Italy, and Japan is also summarized.

Section C, which is devoted to the physical investigations, contains three papers: on the apparatus required for carrying on physical observations in connection with the fisheries, and on a physical and chemical examination of the water in the Moray Firth and the Firths of Inverness, Cromarty, and Dornoch, by Dr. John Gibson and Dr. H. R. Mills, the latter also reporting on the physical observations on the sea to the west of Lewis, taken during the cruise of the *Jackal*, as described previously by Mr. Hoyle. These papers are illustrated by ten graphic plates, with tables, charts, &c.

As may be seen from the foregoing abstract of the Report, the Scottish Fishery Board is doing good and trustworthy work in many directions, and, from a scientific and commercial point of view, it deserves every encouragement from the Government and the public. It would be an important aid if, by interchange of publications, the Board could be kept in touch with the important fishery organizations abroad. Unfortunately, at present the number of copies of the Report placed at the disposal of the Board renders this impossible. This should be remedied speedily, as, from an economical point of view, there should be the freest circulation of knowledge on questions touching such an important industry.

SCIENTIFIC SERIALS.

Revue d'Anthropologie, troisième série, tome iv. (Paris, 1889).—The Hottentots in the Paris Garden of Acclimatization, by M. Deniker. As the group consists of only six men, five women, and two children, the observations and anthropometric measurements made by the author cannot be regarded as contributing any very important facts to general ethnological inquiry. To French readers the subject has, however, the interest of novelty, since it would appear that the physical conformation of these South Africans has not hitherto been often made the subject of careful study among French ethnologists owing to their lack of opportunity for examining the living subject or measuring the cranial remains of the people, since the Museums of France contain scarcely more than thirty skulls in all, including both Hottentots and Bushmen. The observations of M. Deniker agree generally with those of Profs. Flower, Virchow, and Davis; and like them he believes that we must regard the Hottentot as belonging to the dolichocephalic type, while the Bushmen must be included under the mesocephalic group, the cephalic index being, however, nearly the same, 73, for both. The women of the party all presented the well-developed steatopygia, which is generally admitted to be a national characteristic of the sex, this condition being specially marked even in one of the elder women whose body was almost emaciated in all its other parts. A curious abnormality was noted in two of the men, and in one woman, who presented an interdigital membrane between the second and third toes, affecting both feet in one case.—M. S. Reinach in an article on the museum of the Emperor Augustus, whose collection of bones and arms is referred to by Suetonius, points out that owing to inexact interpretations the precise meaning of the writer has gradually been more and more distorted. M. Reinach thinks that we must seek for the site of this so-called museum at Capri, and not on the Roman Palatine, as M. Nadaillac supposes; while he believes that the "*gigantum ossa*" spoken of by Suetonius were fossil bones, popularly characterized as "*arma heroum.*" This opinion, the author thinks, derives support from the story of Samson slaying the Philistines with a jaw-bone; animal bones having been found by primitive peoples to be more readily available as weapons than implements of stone, which required labour for their fabrication. There is no doubt, moreover, from a reference in the Vedic

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hymns to the weapons of Indra, that animal bones were used among the early peoples of the East for purposes of offence and defence.—Continuation of Dr. Seeland's notes on Kashgaria and the passes of the Tian-shan. The author's description of the city of Kashgar, which lies on an extensive elevated plateau 3750 feet above the level of the sea, shows that the spot described in such glowing terms by Marco Polo is now nothing more than a confused network of foul, narrow, and tortuous streets, the houses of which lack every requirement of comfort, and almost of decency, as judged by our notions. The dwellings of the richer people have indeed large gardens filled with luxuriant fruit-trees, but the modern traveller would seek in vain for the shady groves, sparkling fountains, splendid mosques, spacious baths, rich bazaars, and lovely women, spoken of by the old Venetian writer. The ethnic type of the Kashgarians is clearly that of a deteriorated mixed race, in which the original Aryan or Turkish character has been nearly obliterated by repeated admixture with different Mongol races. The Chinese officials, under whose rule the people have long languished, effectually prevent all improvement in the country or the people, as is sufficiently shown by Dr. Seeland's account of the mode in which they govern this once fertile region. Indeed, nothing can be more deplorable than the account given of the personal appearance, character, and sociology of the Kashgarians, who exhibit the most marked slovenliness and incapacity, with a melancholy and passive temperament; and whose only pleasures are derived from an excessive abuse of narcotics, accompanied by a marked degree of sexual depravity, which they have possibly acquired through their intimate association with the Chinese. It fact, honesty seems to be the only virtue left to the Kashgarian. The account given by the author of the effect of Chinese rule in this part of Asia Minor agrees with the views of the late M. Prjevalsky, and certainly seems to warrant the conviction cherished by these travellers that the only apparent chance of ameliorating the condition of the people would depend upon the annexation of Kashgaria to the Russian Empire.—The race of Lagoa Santa of Brazil, by Dr. Soren Hansen. The bones found by M. Lund in the caves of Lagoa Santa were mostly deposited in one of these numerous recesses. These human remains were not associated with any animal bones, from which it could be determined with absolute certainty whether they were contemporaneous with a Tertiary or a Quaternary fauna, while the absence of every kind of implement left the antiquity of the race equally uncertain. These remains, which include fifteen more or less entire skulls, besides a very large number of bone fragments belonging to persons of all ages, are preserved in the Zoological Museum of Copenhagen. All the crania present remarkable uniformity with two skulls, respectively preserved in the British Museum and at Rio, which have been referred by M. Quatrefages to a Papuan type, and they appear to give support to his opinion of the existence over the greater part of South America of a primitive dolichocephalic race, which was subsequently intermingled with peoples presenting a brachycephalic character.

Notes from the Leyden Museum, vol. xi. No. 1, January 1889, contains twenty articles, chiefly descriptions of new genera and species of insects. The more important entomological papers are: Dytiscidæ et Gyrinidæ nouveaux ou rares, par M. Régimbart; Neue Coleopteren, beschrieben von E. Reitter; and a note on *Macronota apicalis*, G. and P., by J. R. H. Neervoort van de Poll.—There are two interesting papers by Dr. R. Horst, on a remarkable Syllis bud, with extrudible segmental organs (plate 1); and contributions towards a knowledge of the Annelida Polychæta (plate 2). This latter note, treats about the species of the genus Arenicola found at Naples: these are *A. claparedi*, Levinsen, possibly peculiar to the Mediterranean, but should be looked for on our southern coasts; *A. cristata*, Stimpson, originally described from South Carolina, but now found at Naples; *A. grubii*, Claparède, very common in the Gulf of Naples.—Dr. F. A. Jentink gives notes on a collection of mammals from East Sumatra, based on the collections made by Dr. B. Hagen. The orang-utan is to be found along the coasts of the northern half of East and West Sumatra, and among the other mammals, hitherto not recorded from Sumatra, though known to occur in Borneo, are *Arctogale stigmatica*, *Hemigalea derbyana*, *Herpestes brachyurus*, *Cynogale bennetti*, *Ptilocercus lowii*, and *Rhizomys dekan*.—Mr. J. Büttikofer gives notes on a new collection of birds from South-Western Africa (plate 4). The collection was made at Gambos, in the Upper Cunene region; it contained 267 skins, representing 103 species, of which number 49 were not mentioned in Mr. Büttikofer's previous list; two species are new, *Lophocercs alboterminatus* and *Francolinus jugularis*.

THE longer papers in the *Nuovo Giornale Botanico Italiano* for January are almost entirely floristic, relating to the phanerogamic or cryptogamic flora of particular districts of Italy.—Signor G. Arcangeli describes a remarkable monstrosity of *Narcissus Tazzetta*, in which the "corona" is divided into six petaloid leaves.—In the Reports of the meetings of the Societa Botanica Italiana, the same botanist follows up his account of the structure of the seed of *Euryale ferox* by a description of those of our common water-lilies, *Nymphæa alba* and *Nuphar luteum*. They all agree in the occurrence of a scanty endosperm, consisting of from one to four layers of cells, and a very copious perisperm.—Signor R. Pirotta describes the mode of fertilization of *Amorphophallus Rivieri*, which is effected almost entirely by a number of different species of Coleoptera.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 15, 1888.—"Observations upon the Electromotive Changes in the Mammalian Spinal Cord following Electrical Excitation of the Cortex Cerebri. Preliminary Notice." By Francis Gotch, Hon. M.A. Oxon., B.A., B.Sc. Lond., and Victor Horsley, B.S., F.R.S., Professor of Pathology, University College, London. (From the Physiological Laboratory of the University of Oxford.)

Hitherto pathologists have attempted the analysis of the epileptic convulsion by the graphic method—that is, by recording the spasmodic contractions of the muscles involved. Recent investigations of this kind have shown that the excitation of the cortex cerebri, whether by electrical or chemical means, or by the presence of certain pathological states, neoplasms, inflammation, &c., is invariably followed in the higher mammals by a definite and characteristic sequence of movements in the muscles. It is, however, obvious that such investigations have up to the present succeeded in determining the characters of the neural disturbance only when this has reached the peripheral terminations of the efferent nerves. Now since the excitatory processes originating in the cortex are conducted by the efferent channels in the spinal cord, presumably the pyramidal tracts, the problem of their relationship to the centres of the bulbo-spinal system cannot be determined by experiments which record the mechanical changes in the muscles. In order to ascertain what share respectively the centres in the cortex and those in the spinal cord have in the production of the characteristic epileptic sequence, the action of the latter must be eliminated. This can be done by investigating the nature of the excitatory processes in the cord when the efferent channels in the dorsal region for the lower limbs are made the subject of observation.

For this purpose we determined to obtain, if possible, evidence as to the nature of the excitatory processes of the epileptic convulsion in the spinal cord, as shown by "tapping" the cord and noting the electromotive changes which, as is well known, accompany functional activity in nerves. The results we have already obtained are so harmonious and demonstrative, that we venture to make this preliminary communication, reserving full details for a subsequent account.

PART I. *The Electromotive Change following a Single Excitation of the Mammalian Nerve.*

Our first experiments were made for the purpose of ascertaining to what extent we could detect an electromotive change following a single excitation of a mammalian nerve. Since the discovery by du Bois-Reymond of the fact that the excitatory process in nerve is accompanied by an electromotive change, the characters and time relations of this change have been investigated by various observers, notably by Bernstein, Hermann, Hering, and Head. The general result of their observations is to show that the change following a single stimulus is of very short duration, so short that the galvanometer gives little evidence of its presence, and the observers referred to were compelled to adopt the device first employed by Bernstein, which involves repeated excitation and consequent summation of effect, a method well known to physiologists as that of the repeating differential rheotome. For our purpose it was essential to obtain evidence of the effect following one stimulus only, and this we were fortunately able to do by using a sensitive Lippmann's capillary electrometer of quick reaction, made by Mr. G. F. Burch, and

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